

**U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: *Pseudotryonia* (=Tryonia) adamantina

COMMON NAME: Diamond Y Spring snail

LEAD REGION: Region 2

INFORMATION CURRENT AS OF: November 2005

STATUS/ACTION:

☐ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

☐ New candidate

☒ Continuing candidate

☐ Non-petitioned

☒ Petitioned - Date petition received: May 11, 2004

☐ 90-day positive - FR date:

☐ 12-month warranted but precluded - FR date:

☐ Did the petition requesting a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? Yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? Yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded.

During the past 12 months, almost our entire national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, emergency listings, and essential litigation-related, administrative, and program management functions. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (<http://endangered.fws.gov/>).

☐ Listing priority change

Former LP: ☐

New LP: ☐

Date when the species first became a Candidate (as currently defined): January 1989

☐ Candidate removal: Former LP: ☐

- ___ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.
- ___ U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.
- ___ F – Range is no longer a U.S. territory.
- ___ I – Insufficient information exists on biological vulnerability and threats to support listing.
- ___ M – Taxon mistakenly included in past notice of review.
- ___ N – Taxon does not meet the Act’s definition of “species.”
- ___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Snails, Hydrobiidae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Texas

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Pecos County, Texas

LAND OWNERSHIP: One hundred percent of the range of the Diamond Y Spring snail occurs on the Diamond Y Preserve which is owned and managed by The Nature Conservancy (TNC). The surrounding watershed and surface area over contributing aquifers is all privately owned.

LEAD REGION CONTACT: Susan Jacobsen, 505-248-6641

LEAD FIELD OFFICE CONTACT: Austin Ecological Services Field Office, Nathan Allan, 512-490-0057

BIOLOGICAL INFORMATION

Historical and Current Range/Distribution: The Diamond Y Spring snail is an aquatic snail occurring only in the Diamond Y Spring system and associated outflows in Pecos County, Texas (Taylor 1987). There is no available information indicating that the historic distribution of this species was larger than the present distribution. However, other area springs may have contained the same species, but because these springs have been dry for more than four decades, there is no opportunity to determine the potential historic distribution.

Species Description & Taxonomy: Diamond Y Spring snail is a very small snail, measuring only 2.9 to 3.6 millimeters (.11 to .14 inches) in length. The shell is narrowly conical, with obtuse apex and broadly rounded anterior end (Taylor 1987). Larger females contain up to 4.75 to 5.75 regularly convex whorls that are swollen to weakly shouldered, and separated by a deeply incised suture (Taylor 1987). Habitat of the species is mud substrates on the margins of small springs, seeps, and marshes in flowing water associated with sedges and cattails (Taylor 1987). These snails likely have life spans of 9 to 15 months and reproduce several times during

the spring to fall breeding season (Taylor 1987, Pennak 1989, Brown 1991). Snails of the family Hydrobiidae are sexually dimorphic with females being characteristically larger and longer-lived than males. The snails are ovoviviparous, producing live young serially (as opposed to broods) (Taylor 1985). They are presumably fine-particle feeders on detritus and periphyton associated with the substrates (mud and vegetation).

In the desert Southwest, aquatic snails are distributed in isolated geographically-separate wetland populations (Hershler et al. 1999). They likely evolved into distinct species during recent dry periods (since the Late Pleistocene, ca. 100,000 years ago) from parent species that once enjoyed a wide distribution during wetter, cooler climates of the Pleistocene. Such divergence has been well-documented for aquatic and terrestrial macroinvertebrate groups within arid ecosystems of western North America (e.g., Taylor 1987, Metcalf and Smartt 1997, Bowman 1981).

Another endemic hydrobiid aquatic snail, the Gonzales springsnail (*Tryonia circumstriata*), also occurs in the Diamond Y Spring system. Recent systematic studies (Hershler et al. 1999, Hershler 2001) of these snails have been conducted using mitochondrial DNA sequences and morphological characters. This analysis supported the unique taxonomic status of both snails at Diamond Y Spring and reclassified the Diamond Y Spring snail into a new genus, *Pseudotryonia* (Hershler 2001). Gonzales springsnail was assigned to a clade of true *Tryonia* made up of 16 species in southwestern North America (Hershler et al. 1999). Diamond Y Spring snail was assigned to a separate clade of four species in this new genus. Gonzales springsnail is distinguished from the closely related Phantom springsnail (*T. cheatumi*) by its narrower, more strongly sculptured shell and more numerous penial papillae (Hershler 2001). These studies confirm that the two snails from the Diamond Y Spring system (*T. circumstriata* and *P. adamantina*) are indeed distinct valid taxa.

Habitat and Population Estimates/Status: The Diamond Y Spring system is a tributary drainage to the Pecos River and is composed of disjunct upper and lower watercourses, separated by about a 1 kilometer (km) (.62 miles (mi)) stretch of dry stream channel. The upper watercourse starts with the Diamond Y Spring head pool and is augmented by numerous small seeps, some of which drain into the spring outflow channel. This outflow channel converges with the Leon Creek drainage and flows through a marsh-meadow, where it is then referred to as Diamond Y Draw. The total upper watercourse is about 1.5 km (0.93 miles) long. The lower watercourse has a smaller head pool spring (Euphrasia Spring) and outflow stream and also has several isolated pools, for example, Mansanto Pool. The total lower watercourse is about 1 km (0.62 miles) long and may extend below the State Highway 18 bridge during wetter seasons or years.

Taylor (1985) documented the distribution and abundance of aquatic snails in the Diamond Y Spring system. At the time of this work in the fall of 1984, he found Diamond Y Spring snail distribution limited to the upper watercourse. It was present at 12 of the 14 sites sampled, with density estimates ranging from 0.5 to 108 individuals per 0.01 square meters, with very low densities in the upstream areas, near the headspring. Taylor (1985) indicates the low density areas were in definite contrast to unpublished data collected by the author in 1968, where the upstream areas of the upper watercourse had very high abundance of Diamond Y Spring snails. This study (Taylor 1985) also found that Gonzales springsnail was limited to only the lower

watercourse in the first 30 meters (98.4 feet) of outflow from Euphrasia Spring. These findings were confirmed by Fullington (1991). Taylor (1985) calculated densities in the range of 469 to 793 individuals per 0.01 square meters for Gonzales springsnail in this short reach of habitat. Taylor (1985) estimated the total population in this reach of over one million individuals would not be unreasonable.

More recent surveys have found that Diamond Y Spring snail is currently found in the isolated spring seeps near the Diamond Y Spring head pool, in side seeps at the downstream end of the upper watercourse and at the immediate outflow of Euphrasia Spring in the lower watercourse (Echelle 2001). Meanwhile, Gonzales springsnail is now found only in the outflow stream of the Diamond Y head pool in the upper watercourse. This distribution is supported by observations of Dr. Robert Hershlers (Echelle 2001). The reason for the apparent reversal in distributional patterns of the two species within the Diamond Y Spring system since the surveys reported by Taylor (1985) is unknown.

Although the two snail species both occur in the Diamond Y Spring system, they have not been taken together at any sample locations (Taylor 1985, 1987; Echelle 1999), with the reported exception by Fullington (1991) where both were collected from a small seep to the side of the Diamond Y Spring head pool. Taylor (1985, 1987) reports the reason for this mutually exclusive distribution is likely a function of competition rather than habitat differences, because the two species appear to occupy the same microhabitats, but are spatially segregated.

THREATS

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

The primary threat to this species is the potential failure of spring flow due to excessive groundwater pumping and/or drought which would result in total habitat loss for the species. Diamond Y Spring is the last major spring still flowing in Pecos County, Texas. Pumping of the regional aquifer system for agricultural production of crops has resulted in the drying of most other springs in this region (Brune 1981). Other springs that have already failed include Comanche Springs, which was once a large surface spring in Fort Stockton, Texas, about 8 miles from Diamond Y. This spring flowed at more than 1200 liters per second (lps) (42 cubic-feet per second (cfs)) (Brune 1981) and undoubtedly provided habitat for rare species of fishes and invertebrates, including aquatic snails. The spring ceased flowing by 1962 (Brune 1981). Leon Springs, located upstream of Diamond Y in the Leon Creek watershed, was measured at 500 lps (18 cfs) in the 1930s and was also known to contain rare fish, but ceased flowing in the 1950s following significant irrigation pumping (Brune 1981). There have been no continuous records of spring flow discharge at Diamond Y Spring to determine any trends in spring flow. We have not yet analyzed the flow data we have been collecting the last few years. While spring flows are low, the information on geohydrology and groundwater pumping is not available to determine the exact relationships of groundwater withdrawals and spring flow.

Studies by Veni (1991) and Boghici (1997) indicate that the spring flow at Diamond Y Spring comes from the Rustler aquifers located west of the spring outlets. One significant factor that influences flows at the spring is the large groundwater withdrawals for agricultural irrigation of farms to the southwest in the Belding-Fort Stockton areas. Although TNC owns and manages

the property surrounding the Diamond Y Spring system, it has no control over groundwater use that affects spring flow. The spring flow is very small (1 to 2 cfs) causing any measurable decreases to be substantial.

Oil and gas activities threaten this snail because of the potential groundwater or surface water contamination from pollutants (Veni 1991, Fullington 1991). The Diamond Y Spring system is within an active oil and gas extraction field. At this time there are still many active wells located within a hundred meters of surface waters. In addition, a natural gas refinery is located within 0.8 km (0.5 mi) upstream of Diamond Y Spring. Oil and gas has been happening for many decades, since at least the 1960's. There is no evidence of a present destruction of habitat, however, the possibility of leaks or spills contaminating the habitat provides an ongoing threat to the species. Oil and gas pipelines cross the habitat; many oil extraction wells are located with 50 meters of the habitat. The potential for a catastrophic event is real and is possible to occur at any time. There are also old brine pits associated with previous drilling within feet of surface waters. If these pits were to leak into the habitat of the species, the effects may be measurable. However, there is currently no regular monitoring occurring for these species, so it is unlikely that anyone would detect the effects. Oil and gas pipelines cross the spring outflow channels and marshes where the species occurs, creating a constant potential for contamination from pollutants from leaks or spills. These activities pose a threat to the habitat of the snail by creating the potential for pollutants to enter underground aquifers that contribute to spring flow or by point sources from spills and leaks of petroleum products on the surface.

As an example of this threat, in 1992 approximately 10,600 barrels of crude oil were released from a 6-inch pipeline that traverses Leon Creek above its confluence with Diamond Y Draw. The oil was from a ruptured pipeline at a point several hundred feet away from the Leon Creek channel. The site itself is about one mile overland from Diamond Y Spring. The distance that surface runoff of oil residues must travel is about two miles down Leon Creek to reach Diamond Y Draw. The pipeline was operated at the time of the spill by the Texas-New Mexico Pipeline Company, but ownership has since been transferred to several other companies. Texas Railroad Commission has been responsible for overseeing cleanup of the spill site. Remediation of the site initially involved aboveground land farming of contaminated soil and rock strata to allow microbial degradation. In recent years, remediation efforts have focused on vacuuming oil residues from the surface of groundwater exposed by trenches dug at the spill site. To date, no impacts on the rare fauna of Diamond Y Spring have been observed, but no specific monitoring of the effects of the spill was undertaken.

B. Overutilization for commercial, recreational, scientific, or educational purposes. Not known to be a factor threatening the Diamond Y Spring snail.

C. Disease or predation. None known. However, the presence of introduced species (*Melanoides* snail) increases the potential for foreign diseases to affect the species (See Factor E).

D. The inadequacy of existing regulatory mechanisms. Texas State law provides no protection for these invertebrate species. There are no existing Federal, State or local regulatory

mechanisms providing protection for these species. The snails are afforded some protection indirectly due to the presence of two fishes (Leon Springs pupfish (*Cyprinodon bovinus*) and Pecos gambusia (*Gambusia nobilis*)) listed as endangered by State and Federal governments that occupy similar habitats. However, the snail may be more sensitive to changes in water quality than the fish (Lang (2002) and are more directly threatened by the presence of the exotic *Melanoides* snail, than the endangered fish.

Some protection for the habitat of this species is provided with the ownership of the springs by TNC (Karges 2003). However, this land ownership provides no protection from the main threat to this species—the loss of necessary groundwater levels to ensure adequate spring flows. Texas groundwater resources are under the “Rule of Capture,” which provides little opportunity for regulation of pumping or management of groundwater resources (Potter 2004). Local groundwater districts are the method for groundwater management in Texas. Although Diamond Y Spring is within the jurisdiction of the Middle Pecos Groundwater Conservation District, groundwater districts will not generally limit groundwater use to allow for conservation of surface water flows (Booth and Richard-Crow 2004, Caroom and Maxwell 2004).

E. Other natural or manmade factors affecting its continued existence. Within the last 10 years, an exotic snail, *Melanoides* sp., has become established in Diamond Y Spring (Echelle 2001, McDermott 2000). The species is by far the most abundant snail in the upper watercourse of the Diamond Y Spring system. So far it has not been detected in the lower water course (Echelle 2001). In many locations, this exotic snail is so numerous that it essentially is the substrate in the small stream channel. The effects of this introduction are not yet known. However, this exotic snail is likely competing with native snails for space and resources. Other changes to the ecosystem from the dominance of this species are likely to occur and could have detrimental effects to the native invertebrate community.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED: Few recent conservation actions at Diamond Y Spring have been undertaken that benefit the snail. Land management by TNC to manage cattle grazing (no grazing is currently occurring) may have some benefits.

SUMMARY OF THREATS: These snails are primarily threatened with habitat loss due to springflow declines from drought and from pumping of groundwater. Additional threats include potential water contamination from accidental releases of petroleum products, as their habitat is in an active oil and gas field. Also, a nonnative aquatic snail (*Melanoides* sp.) was recently introduced (within the last 10 years) into the native snails’ habitat and may compete with endemic snails for space and resources. Limited distribution of this narrow endemic makes any impact from increasing threats (loss of springflow, contaminants, nonnative species) likely to result in the extinction of the species.

For species that are being removed from candidate status:

___ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

LISTING PRIORITY:

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2*
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude: Limited distribution of this narrow endemic (two small, interconnected springs) makes any impact from increasing threats (loss of springflow, contaminants, nonnative species) likely to result in the extinction of the species.

Imminence: This species occurs in an arid region plagued by drought and ongoing aquifer withdrawals, making the likelihood of the total loss of springflows very high. Therefore, we regard the threat as imminent. Species habitat is in an active oil and gas field with constant threats from contamination. There are numerous oil and gas pipelines that transect the species habitat, active and abandoned wells within 100 m of the species habitat, and a refinery within 0.8 km to the only habitat (two small springs) available to the species. If one of these pipelines were to spill, the species could go extinct, with no detection until after the fact. A nonnative *Melanoides* snail has invaded occupied habitat in the last decade and may compete with endemic snails for space and resources.

 X Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed? Yes.

Is Emergency Listing Warranted? Due to the current status of the species and its habitat, emergency listing of the Diamond Y Spring snail is not warranted at this time. Also, because the snail is sympatric with two endangered fishes and the threatened Pecos sunflower, it benefits from any conservation actions that have been and are being undertaken to recover these species.

DESCRIPTION OF MONITORING: Qualitative monitoring of the snail occurs sporadically by U.S. Fish and Wildlife Service (Service) personnel, university researchers, and State agency personnel. In 2003, New Mexico Department of Game and Fish confirmed that the snails are persisting in the upper water course at Diamond Y Preserve. Spring habitats are generally monitored by TNC. Flows from Diamond Y Spring are monitored by the Service. There is currently no regular monitoring of the population status or trends of the snail.

COORDINATION WITH STATES

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: Texas

Indicate which State(s) did not provide any information or comments: NA

LITERATURE CITED

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APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: /s/ Rich McDonald 11/17/2005
Acting Regional Director, Fish and Wildlife Service Date



Concur: _____ August 23, 2006
Acting Director, Fish and Wildlife Service Date

Do not concur: _____
Director, Fish and Wildlife Service Date

Director's Remarks:

Date of annual review: November 2005
Conducted by: Nathan Allan

Comments:

